CLAIMS

1. A carrier on which a compound can be synthesised, wherein said carrier has at least two attributes integrally associated therewith, which attributes are detectable and/or quantifiable during synthesis of the compound and which define a code identifying the carrier before, during and after said synthesis, with the proviso that one of said attributes is other than shape, or surface deformation(s) of the carrier.

2. The carrier of claim 1, wherein at least one of said attributes is comprised within or internally of the carrier.

3. The carrier of claim 1, wherein at least one of said attributes is an electromagnetic radiation-related attribute.

4. The carrier of claim 3, wherein the electromagnetic radiation-related attribute is selected from the group consisting of fluorescence emission, luminescence, phosphorescence, infrared radiation, electromagnetic scattering including light and X-ray scattering, light transmittance, light absorbance and electrical impedance.

5. The carrier of claim 3, wherein the electromagnetic radiation-related attribute is a light emitting, light transmitting or light absorbing attribute detectable by illuminating the carrier with incident light of one or more selected wavelengths or of one or more selected vectors.

6. The carrier of claim 1, having at least three detectable and/or quantifiable attributes integrally associated therewith.

7. The carrier of claim 3, wherein the electromagnetic radiation-related attribute comprises a fluorescent dye.

8. The carrier of claim 1, wherein the carrier is a colloidal particle.

9. The carrier of claim 1, wherein the carrier is a colloidal particle in the form of a pellet, disc, capillary, hollow fibre needle, pin or chip.

10. The carrier of claim 9, wherein the colloidal particle is a polymeric or ceramic particle.

11. The carrier of claim 10, wherein the ceramic particle is a silica particle.

12. The carrier of claim 10, wherein the ceramic particle has a diameter of about 0.01 μm to about 150 μm.

13. The carrier of claim 1, having a shape selected from the group consisting of spheres, cubes, rectangular prisms, pyramids, cones, ovoids, sheets or cylinders.

14. The carrier of claim 1, wherein the carrier comprises functionalities selected from the group consisting of $-NH_2$, -COOH, -SOH, -SSH and sulfate.

15. A plurality of carriers on which a plurality of different compounds can be synthesised, including a population of detectably distinct carriers each having a code, which distinctively identifies a respective carrier before, during and after said synthesis from other carriers, and which is characterised by at least two detectable and/or quantifiable attributes integrally associated with the carrier, with the proviso that one of said attributes is other than shape, or surface deformation(s) of the carrier.

16. The plurality of carriers of claim 15, wherein at least one of said attributes of a respective carrier is comprised within or internally of the carrier.

17. The plurality of carriers of claim 15, wherein at least one of said attributes of a respective carrier is an electromagnetic radiation-related attribute.

18. The plurality of carriers of claim 17, wherein the electromagnetic radiation-related attribute is selected from the group consisting of fluorescence emission, luminescence, phosphorescence, infrared radiation, electromagnetic scattering including light and X-ray scattering, light transmittance, light absorbance and electrical impedance.

19. The plurality of carriers of claim 17, wherein the electromagnetic radiation-related attribute is a light emitting, light transmitting or light absorbing attribute detectable by illuminating the carrier with incident light of one or more selected wavelengths or of one or more selected vectors.

20. The plurality of carriers of claim 15, wherein a respective carrier has at least three detectable and/or quantifiable attributes integrally associated therewith.

21. The plurality of carriers of claim 17, wherein the electromagnetic radiation-related attribute of a respective carrier comprises a fluorescent dye.

22. The plurality of carriers of claim 15, wherein each carrier is a colloidal particle.

23. The plurality of carriers of claim 15, wherein the carriers have different shapes selected from the group consisting of spheres, cubes, rectangular prisms, pyramids, cones, ovoids, sheets or cylinders.

24. The plurality of carriers of claim 15, wherein the carriers have different forms selected from the group consisting of pellet, disc, capillary, hollow fibre needle, pin and chip.

25. The plurality of carriers of claim 15, wherein the carriers have different sizes.

26. The plurality of carriers of claim 22, wherein the colloidal particle is a polymeric or ceramic particle.

27. The plurality of carriers of claim 26, wherein the ceramic particle is a silica particle.

28. The plurality of carriers of claim 26, wherein the carriers comprise ceramic particles with different diameters selected from about 0.01 μm to about 150 μm.

29. The plurality of carriers of claim 15, wherein a respective carrier comprises functionalities selected from the group consisting of $-NH_2$, -COOH, -SOH, -SSH and sulfate.

30. A method of producing a plurality of carriers including a population of detectably distinct carriers, comprising the steps of: -

(a) preparing a plurality of carriers having different codes wherein each code is characterised by at least two detectable and/or quantifiable attributes integrally associated with a respective carrier;

(b) detecting and/or quantifying the said attributes of each carrier to thereby assign a code for each carrier;

(c) identifying carriers having distinctive codes;

(d) identifying carriers having similar codes; and

(e) sorting the carriers having distinctive codes from the carriers having non-distinctive codes to thereby provide a plurality of carriers including a population having detectably distinct codes.

31. The method of claim 30, wherein step (a) is characterised in that the carriers are prepared by a split-process-recombine procedure.

32. The method of claim 30, wherein step (a) is characterised in that said least two attributes of a respective carrier results from a split-process recombine procedure.

33. The method of claim 32, wherein step (a) is further characterised in that one or more of the said at least two attributes of a respective carrier is layered onto the carrier.

34. The method of claim 30, wherein step (b) is characterised in that at least three different detectable and/or quantifiable attributes of a respective carrier are detected and/or quantified for code recordal.

35. The method of claim 30, wherein at least one of said attributes of a respective carrier is comprised within, or internally of, the carrier.

36. The method of claim 30, wherein at least one of said attributes of a respective carrier is an electromagnetic radiation-related attribute.

37. The method of claim 36, wherein step (b) is further characterised in that the electromagnetic radiation-related attribute is selected from the group consisting of fluorescence emission, luminescence, phosphorescence, infrared radiation, electromagnetic scattering including light and X-ray scattering, light transmittance, light absorbance and electrical impedance.

38. The method of claim 36, wherein step (b) is further characterised in that the electromagnetic radiation-related attribute is interrogated by illuminating the carrier with incident light of one or more selected wavelengths or of one or more selected vectors.

39. A method of synthesising and deconvoluting a combinatorial library comprising the steps of: -

(a) apportioning in a stochastic manner among a plurality of reaction vessels a plurality of carriers on which a plurality of different compounds can be synthesised, wherein said plurality of carriers includes a population of detectably distinct carriers each having a code, which distinctively identifies a respective carrier before, during and after said synthesis from other carriers, and which is characterised by at least two detectable and/or quantifiable attributes integrally associated with the carrier, with the proviso that one of said attributes is other than shape, or surface deformation(s) of the carrier;

(b) determining and recording the codes of said plurality of carriers in order to track the movement of individual detectably distinct carriers into particular reaction vessels of said plurality of reaction vessels, wherein said codes are determined prior to step (d);

(c) reacting the carriers in each reaction vessel with a synthon;

(d) pooling the carriers from each reaction vessel;

(e) apportioning the carriers in a stochastic manner among the plurality of reaction vessels;

(f) reacting the carriers in each reaction vessel with another synthon;

(g) recording the codes of said plurality of carriers in order to track the movement of individual detectably distinct carriers into particular reaction vessels of said plurality of reaction vessels, wherein said codes are recorded after step (e) or step (f);

(h) pooling the carriers from each reaction vessel; and

(i) iterating steps (e) through (h) as necessary to create a combinatorial compound library wherein member compounds of the library are associated with the detectably distinct carriers and wherein codes of the detectably distinct carriers are deconvolutable using tracking data provided by said recordal steps to identify the sequence of reactions experienced by the said detectably distinct carriers.

40. The method of claim 39, wherein the codes of the plurality of carriers are determined prior to step (d).

41. The method of claim 39, wherein steps (b) and (g) are further characterised in that at least three different detectable and/or quantifiable attributes of a respective carrier are detected and/or quantified for code recordal.

42. The method of claim 39, wherein at least one of said attributes of a respective carrier is comprised within, or internally of, the carrier.

43. The method of claim 39, wherein at least one of said attributes of a respective carrier is an electromagnetic radiation-related attribute.

44. The method of claim 43, wherein steps (b) and (g) are further characterised in that the electromagnetic radiation-related attribute is selected from the group consisting of fluorescence emission, luminescence, phosphorescence, infrared radiation, electromagnetic scattering including light and X-ray scattering, light transmittance, light absorbance and electrical impedance.

45. The method of claim 43, wherein steps (b) and (g) are further characterised in that the electromagnetic radiation-related attribute is interrogated by illuminating the carrier with incident light of one or more selected wavelengths or of one or more selected vectors.

46. The method of claim 39, wherein at least steps (g) and (e) are performed in a flow cytometer.

47. A combinatorial compound library produced by the method of any one of claims 39 to 46.

48. A kit comprising: -

(a) a combinatorial compound library including a plurality of different compounds wherein each compound is attached to at least one of a plurality of carriers, which includes a population of detectably distinct carriers each having a distinctive code, which distinctively identifies a respective carrier before, during and after synthesis of a corresponding compound from other carriers, and which is characterised by at least two detectable and/or quantifiable attributes integrally associated with the carrier, with the proviso that one of said attributes is other than shape, or surface deformation(s) of the carrier; and

(b) tracking data on each distinctive code to identify the sequence of reactions experienced by a respective detectably distinct carrier.

49. The kit of claim 48, wherein at least one of said attributes of a respective carrier is comprised within or internally of the carrier.

50. The kit of claim 48, wherein at least one of said attributes of a respective carrier is an electromagnetic radiation-related attribute.

51. The kit of claim 50, wherein the electromagnetic radiation-related attribute is selected from the group consisting of fluorescence emission, luminescence, phosphorescence, infrared radiation, electromagnetic scattering including light and X-ray scattering, light transmittance, light absorbance and electrical impedance.

52. The kit of claim 50, wherein the electromagnetic radiation-related attribute is a light emitting, light transmitting or light absorbing attribute detectable by illuminating the carrier with incident light of one or more selected wavelengths or of one or more selected vectors.

53. The kit of claim 48, wherein a respective carrier has at least three detectable and/or quantifiable attributes integrally associated therewith.

54. The kit of claim 48, wherein the electromagnetic radiation-related attribute of a respective carrier comprises a fluorescent dye.

55. The kit of claim 48, wherein each carrier is a colloidal particle.

56. The kit of claim 48, wherein the carriers have different shapes selected from the group consisting of spheres, cubes, rectangular prisms, pyramids, cones, ovoids, sheets or cylinders.

57. The kit of claim 48, wherein the carriers have different forms selected from the group consisting of pellet, disc, capillary, hollow fibre needle, pin and chip.

58. The kit of claim 48, wherein the carriers have different sizes.

59. The kit of claim 55, wherein the colloidal particle is a polymeric or ceramic particle.

60. The kit of claim 59, wherein the ceramic particle is a silica particle.

61. The kit of claim 59, wherein the carriers comprise ceramic particles with different diameters selected from about 0.01 μm to about 150 μm.

62. The kit of claim 48, wherein a respective carrier comprises functionalities selected from the group consisting of $-NH_2$, -COOH, -SOH, -SSH and sulfate.